

Complete Summary

GUIDELINE TITLE

Use of cardiac biomarkers for acute coronary syndromes. Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing.

BIBLIOGRAPHIC SOURCE(S)

Storrow AB, Apple FS, Wu AH, Jesse R, Francis G, Christenson RH. Use of cardiac biomarkers for acute coronary syndromes. In: Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing. Washington (DC): National Academy of Clinical Biochemistry (NACB); 2006. p. 13-20. [83 references]

GUIDELINE STATUS

This is the current release of the guideline.

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SCOPE

DISEASE/CONDITION(S)

Acute coronary syndrome (ACS)

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Family Practice
Internal Medicine

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Clinical Laboratory Personnel
Emergency Medical Technicians/Paramedics
Health Care Providers
Hospitals
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

- To examine the application of evidence-based medicine (EBM) to the form of diagnostic testing known as point-of-care testing (POCT).

Note: For the purpose of this document, POCT is defined as "clinical laboratory testing conducted close to the site of patient care, typically by clinical personnel whose primary training is not in the clinical laboratory sciences or by patients (self-testing). POCT refers to any testing performed outside of the traditional, core or central laboratory."

- To systematically review and synthesize the available evidence on the effectiveness of POCT, with specific focus on outcomes in the areas of:
 1. Patient/health
 2. Operational/management
 3. Economic benefit
- To provide guidelines on the use of biomarkers of cardiac injury in the emergency department (ED)

TARGET POPULATION

Patients presented to the emergency department (ED) with suspected acute coronary syndrome (ACS)

INTERVENTIONS AND PRACTICES CONSIDERED

Use of cardiac biomarkers for the diagnosis or rule-out of acute coronary syndrome (ACS)

MAJOR OUTCOMES CONSIDERED

- Patient/health
- Operational/management
- Economic benefit

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

For a specific clinical use, pertinent clinical questions were formulated and key search terms were ascertained for the literature search. Searches were conducted on MEDLINE, EMBASE, or PubMed and were supplemented with the use of the National Guideline Clearinghouse, the Cochrane Group, or evidence-based medicine (EBM) reviews. Additionally, authors' personal article collections were used. Acceptable citations were limited to peer-reviewed articles with abstracts, those published in English, and those involving human subjects.

To be included in the full systematic review of the clinical question, articles selected for full text review were examined for at least 1 relevant outcomes measurement.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

- I. Evidence includes consistent results from well-designed, well-conducted studies in representative populations.
- II. Evidence is sufficient to determine effects, but the strength of the evidence is limited by the number, quality, or consistency of the individual studies; generalizability to routine practice; or indirect nature of the evidence.
- III. Evidence is insufficient to assess the effects on health outcomes because of limited number or power of studies, important flaws in their design or conduct, gaps in the chain of evidence, or lack of information.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Abstracts identified by the literature searches were reviewed by 2 individuals to determine initial eligibility or ineligibility for full-text review, using Form 1 (Appendix A - see the "Availability of Companion Documents" field). If there was not consensus, then a third individual reviewed the abstract(s). To be included in the full systematic review of the clinical question, articles selected for full text review were examined for at least 1 relevant outcomes measurement. The systematic review consisted of creating evidence tables using Form 2 (Appendix A - see the "Availability of Companion Documents" field) that incorporated the following characteristics:

1. Study design—Prospective or retrospective, randomized, and controlled, patient inclusion/exclusion criteria, blinding, number of subjects, etc.
2. Appropriateness of controls
3. Potential for bias (consecutive or nonconsecutive enrollment)
4. Depth of method description—full-length report or technical brief
5. Clinical application—screening, diagnosis, management
6. Specific key outcomes and how they were measured
7. Conclusions are logically supported

For the assessment of study quality, the general approach to grading evidence developed by the US Preventive Services Task Force was applied (see the "Rating Scheme for the Strength of the Evidence" field). Once that was done, an assessment of study quality was performed, looking at the individual and aggregate data at 3 different levels using Forms 3 and 4 (Appendix A - see the "Availability of Companion Documents" field). At the first level, the individual study design was evaluated, as well as internal and external validity. Internal validity is the degree to which the study provides valid evidence for the populations and setting in which it was conducted. External validity is the extent to which the evidence is relevant and can be generalized to populations and conditions of other patient populations and point-of-care testing (POCT) settings.

The synthesis of the volume of literature constitutes the second level, Form 5 (Appendix A - see the "Availability of Companion Documents" field). Aggregate internal and external validity was evaluated, as well as the coherence/consistency of the body of data. How well does the evidence fit together in an understandable model of how POCT leads to improved clinical outcome? Ultimately, the weight of the evidence about the linkage of POCT to outcomes is determined by assessing the degree to which the various bodies of evidence (linkages) "fit" together. To what degree is the testing in the same population and condition in the various linkages? Is the evidence that connects POCT to outcome direct or indirect? Evidence is direct when a single linkage exists but is indirect when multiple linkages are required to reach the same conclusion.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The field of point-of-care testing (POCT), diagnostic testing conducted close to the site of patient care, was divided into disease- and test-specific focus areas.

Groups of expert physicians, laboratorians, and diagnostic manufacturers in each focus area were assembled to conduct systematic reviews of the scientific literature and prepare guidelines based on the strength of scientific evidence linking the use of POCT to patient outcome.

Final guidelines were made according to Agency for Healthcare Research and Quality (AHRQ) classification (see the "Rating Scheme for the Strength of the Recommendations" field). The guidelines are evidence based and require scientific evidence that the recipients of POCT experience better health outcomes than those who did not and that the benefits are large enough to outweigh the risks. Consensus documents are not research evidence and represent guidelines for clinical practice, and inclusion of consensus documents was based on the linkages to outcomes, the reputation of the peer organization, and the consensus process used to develop the document. Health outcomes, e.g., benefit/harm, are the most significant outcomes in weighing the evidence and drafting guidelines.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Strength of Recommendations

A - The National Academy of Clinical Biochemistry (NACB) strongly recommends adoption; there is good evidence that it improves important health outcomes and concludes that benefits substantially outweigh harms.

B - The NACB recommends adoption; there is at least fair evidence that it improves important health outcomes and concludes that benefits outweigh harms.

C - The NACB recommends against adoption; there is evidence that it is ineffective or that harms outweigh benefits.

I - The NACB concludes that the evidence is insufficient to make recommendations; evidence that it is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The guidelines were presented in open forum at the American Association for Clinical Chemistry (AACC) Annual Meeting (Los Angeles, CA, USA) in July 2004. Portions of these guidelines were also presented at several meetings between 2003 and 2005. Participants at each meeting had the ability to discuss the merits of the guidelines and submit comments to the National Academy of Clinical

Biochemistry (NACB) Web site for formal response by the NACB during the open comment period from January 2004 through October 2005.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the levels of evidence (I—III) and grades of the recommendation (A, B, C, I) are presented at the end of the "Major Recommendations" field.

Note from the National Academy of Clinical Biochemistry (NACB) and the National Guideline Clearinghouse (NGC): *The Laboratory Medicine Practice Guidelines (LMPG) evidence-based practice for point-of-care testing sponsored by the NACB have been divided into individual summaries covering disease- and test-specific areas. In addition to the current summary, the following are available:*

- [Chapter 1: Management](#)
- [Chapter 2: Transcutaneous Bilirubin Testing](#)
- [Chapter 4: Coagulation](#)
- [Chapter 5: Critical Care](#)
- [Chapter 6: Diagnosis and Management of Diabetes Mellitus](#)
- [Chapter 7: Drugs and Ethanol](#)
- [Chapter 8: Infectious Disease](#)
- [Chapter 9: Occult Blood](#)
- [Chapter 10: Intraoperative Parathyroid Hormone](#)
- [Chapter 11: pH Testing](#)
- [Chapter 12: Renal Function Testing](#)
- [Chapter 13: Reproductive Testing](#)

Who are the stakeholders who should be involved in developing an accelerated protocol for use of biomarkers for evaluation of patients with possible acute coronary syndrome (ACS)?

Guideline 12. Members of emergency departments (EDs), primary care physicians, divisions of cardiology, hospital administrations, and clinical laboratories should work collectively to develop an accelerated protocol for the use of biochemical markers in the evaluation of patients with possible ACS.

Strength/consensus of recommendation: A

Level of evidence: III

Where should accelerated protocols for diagnosis or the rule-out of acute myocardial infarction (AMI) be implemented?

Guideline 13. For simplicity, this protocol should apply to either the facilitated diagnosis or the rule-out of AMI in the ED or to routine diagnosis from other areas of the hospital, should a patient develop symptoms consistent with ACS while hospitalized.

Strength/consensus of recommendation: B

Level of evidence: III

How should the effectiveness of accelerated protocols for diagnosis or the rule-out of AMI be assessed and measured?

Guideline 14. Members of EDs, divisions of cardiology, primary care physicians, hospital administrations, and clinical laboratories should work collectively to use quality-assurance measures, evidence-based guidelines, and monitoring to reduce medical error and improve the treatment of patients with possible ACS.

Strength/consensus of recommendation: A

Level of evidence: III

What should be the reference point for reporting the temporal sequence of blood specimens for patients suspected of having ACS?

Guideline 15. For routine clinical practice, blood collections should be referenced relative to the time of presentation to the ED and (when available) the reported time of chest-pain onset.

Strength/consensus of recommendation: A

Level of evidence: III

In addition to members of EDs, primary care physicians, divisions of cardiology, hospital administrations, and clinical laboratories, are there others who need to be involved in accelerated pathways for ACS patients?

Guideline 16. The multidisciplinary team must include personnel knowledgeable about local reimbursement. Vendors should work with customers to help optimize cost-effective provision of biomarker testing.

Strength/consensus of recommendation: A

Level of evidence: II

How rapidly are results of cardiac biomarker testing needed by clinicians? What standard for measurement for turnaround time (TAT) should be used?

Guideline 17. The laboratory should perform cardiac marker testing with a TAT of 1 h, optimally 30 min, or less. The TAT is defined as the time from blood collection to the reporting of results.

Strength/consensus of recommendation: A

Level of evidence: II

Is there a recommended strategy for laboratories that are unable to deliver cardiac biomarker results in a time frame of 1 h from time of collection to result reporting?

Guideline 18. Institutions that cannot consistently deliver cardiac marker TATs of ~1 h should implement point-of-care (POC) testing devices.

Strength/consensus of recommendation: B

Level of evidence: II

What should be the performance specifications and characteristics of POC technology for measurement of cardiac biomarkers?

Guideline 19. Performance specifications and characteristics for central laboratory and POC platforms should not differ.

Strength/consensus of recommendation: A

Level of evidence: III

What stakeholder(s) should be involved in device and platform selection, training, operator competency assessment, maintenance of POC equipment, and compliance with regulatory requirements?

Guideline 20. Laboratory personnel must be involved in selection of devices, the training of individuals to perform the analysis, the maintenance of POC equipment, the verification of the proficiency of operators on a regular basis, and the compliance of documentation with requirements by regulatory agencies.

Strength/consensus of recommendation: A

Level of evidence: III

Are qualitative (positive/negative) devices appropriate for assessment of cardiac biomarker results?

Guideline 21. Although it is recognized that qualitative systems do provide useful information, it is recommended that POC systems provide quantitative results.

Strength/consensus of recommendation: B

Level of evidence: II

What is the process that should be used as new biomarkers are developed and introduced into clinical use?

Guideline 22. Early in the process, manufacturers are encouraged to seek assistance and provide support to professional organizations such as the American Association for Clinical Chemistry (AACC) and International Federation of Clinical Chemistry (IFCC) to develop committees for standardizing and establishing performance specifications for new analytes. These organizations will determine the need for analyte standardization according to the potential clinical importance of the marker and gather the necessary scientific expertise for the formation of a standardization committee.

Strength/consensus of recommendation: A

Level of evidence: III

Definitions:

Levels of Evidence

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CLINICAL ALGORITHM(S)

Not stated

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

It is hoped that these guidelines will be useful for those implementing new testing, as well as those reviewing the basis of current practice. These guidelines should help sort fact from conjecture when testing is applied to different patient populations and establish proven applications from off-label and alternative uses of point-of-care testing (POCT). These guidelines will also be useful in defining mechanisms for optimizing patient outcome and identify areas lacking in the current literature that are needed for future research.

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- The material in this monograph represents the opinions of the editors and does not represent the official position of the National Academy of Clinical Biochemistry or any of the cosponsoring organizations.
- Point-of-care testing (POCT) is an expanding delivery option because of increased pressure for faster results. However, POCT should not be used as a core laboratory replacement in all patient populations without consideration of the test limitations and evaluation of the effect of a faster result on patient care.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Storrow AB, Apple FS, Wu AH, Jesse R, Francis G, Christenson RH. Use of cardiac biomarkers for acute coronary syndromes. In: Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing. Washington (DC): National Academy of Clinical Biochemistry (NACB); 2006. p. 13-20. [83 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006

GUIDELINE DEVELOPER(S)

National Academy of Clinical Biochemistry - Professional Association

SOURCE(S) OF FUNDING

National Academy of Clinical Biochemistry

GUIDELINE COMMITTEE

Guidelines Committee

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [National Academy of Clinical Biochemistry \(NACB\) Web site](#).

Print copies: National Academy of Clinical Biochemistry publications are available through American Association for Clinical Chemistry (AACC) Press. To make a purchase or request a catalog, contact AACC Customer Service at 202-857-0717 or custserv@aacc.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Preface and introduction. In: Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing. Washington (DC): National Academy of Clinical Biochemistry (NACB); 2006. p. i-xvi.

- Appendix A: NACB LMPG data abstraction forms. In: Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing. Washington (DC): National Academy of Clinical Biochemistry (NACB); 2006. p. 149-153.
- Appendix B: literature searches. In: Laboratory medicine practice guidelines: evidence-based practice for point-of-care testing. Washington (DC): National Academy of Clinical Biochemistry (NACB); 2006. p. 154-186.

Electronic copies: Available in Portable Document Format (PDF) from the [National Academy of Clinical Biochemistry \(NACB\) Web site](#).

Print copies: National Academy of Clinical Biochemistry publications are available through American Association for Clinical Chemistry (AACC) Press. To make a purchase or request a catalog, contact AACC Customer Service at 202-857-0717 or custserv@aacc.org.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on August 10, 2007. The information was verified by the guideline developer on September 24, 2007.

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Date Modified: 10/6/2008

